

WHAT WE CLAIM IS:

1. A method for preparing a document by a first computer for delivery to other computers over a computer network, the method comprising the steps of:
 - decomposing the document into nodes in accordance with a document model of the document;
 - associating the nodes with a virtual layout space having one or more of regions; and
 - scheduling delivery of the nodes.
2. The method of claim 1, wherein each of the nodes is associated with at least one region.
3. The method of claim 1, wherein each of the nodes further comprises one or more levels of resolution.
4. The method of claim 1, further comprising the step of grouping the nodes in a plurality of batches, wherein each of the plurality of batches comprises at least one node.
5. The method of claim 4, wherein one of the plurality of batches comprises all the nodes, wherein all or some of the nodes are represented in the coarsest resolution of the one or more levels of resolution.
6. A method for delivering a document by a first computer to a second computer over a computer network, the method comprising the steps of:
 - receiving a request for the document from the second computer;
 - retrieving the document from a memory, wherein the document comprises a document model;

decomposing the document into a plurality of nodes in accordance with the document model;

creating a plurality of resolution levels for one or more of the plurality of nodes;

associating each of the plurality of nodes with at least one region of a virtual layout space;

delivering an initial batch of nodes to the second computer, wherein the initial batch comprises nodes in a coarse resolution of the plurality of resolution levels; and

supplementing the second computer with a subsequent batch of nodes, wherein the subsequent batch comprises nodes in a finer resolution of the plurality of resolution levels.

7. The method of claim 6, further comprising the step of grouping the initial and subsequent batches in accordance with characteristics of the second computer, wherein the characteristics comprise one or more of a number of bits for color, a clock speed of central processing unit, a screen size, and a network connectivity associated with the second computer.

8. The method of claim 7, wherein the grouping step is based on a data anticipation analysis.

9. The method of claim 8, wherein the data anticipation analysis is performed by the first computer based at least in part on how the document had been previously delivered to other computers.

10. The method of claim 8, wherein the data anticipation analysis is performed by the second computer based at least in part on how the initial batch is manipulated by a user of the second computer.

11. The method of claim 6, wherein the associating step comprises a spatial lookup table.

12. The method of claim 6, wherein the virtual layout space can be adjusted to conform to a screen size of the second computer.

13. The method of claim 6, wherein each of the initial and subsequent batches comprises one or more regions of the virtual layout space.

14. A system for preparing a document for delivery over a computer network comprising:

 a memory in communication with the computer network, wherein the memory contains the document; and

 a first computer in communication with the computer network and the memory, wherein the first computer is adapted to receive a request for the document from a second computer over the computer network and to obtain characteristics associated with the second computer,

 wherein when the request is received from the second computer, the first computer retrieves the document from the memory, decomposes the document into a plurality of nodes in accordance with a document model associated with the document, associates the plurality of nodes with one or more regions of a virtual layout space, creates a plurality of resolution levels for one or more of the plurality of nodes, renders to the second computer a first number of the plurality of nodes represented in a coarse resolution suitable for the client, supplements the second computer with a second number of the plurality of nodes represented in a finer resolution based on a data anticipation analysis.

15. The system of claim 14, wherein the characteristics comprise one or more of a number of bits for color, a clock speed of central processing unit, a screen size, and a network connectivity associated with the second computer.

16. The system of claim 14, wherein the data anticipation analysis is based at least in part on how nodes of the document have been previously rendered by the first computer to other computers prior to the request from the second computer.

17. The system of claim 14, wherein each of the plurality of nodes is associated with at least one region of the virtual layout space.

18. The system of claim 14, wherein the virtual layout space is as large as a screen size of the document.

19. The system of claim 14, wherein a spatial lookup table is used to associate the plurality of nodes with the one or more regions of the virtual layout space.

20. A method for delivering a document by a first computer to a second computer over a computer network, the method comprising the steps of:

the first computer receiving a request for the document from the second computer;

the second computer providing a screen size of the second computer to the first computer;

the first computer retrieving the document from a memory;

the first computer decomposing the document into a plurality of nodes in accordance with a document model associated with the document;

the first computer associating each of the plurality of nodes with at least one region of a virtual layout space that conforms with the screen size of the second computer;

the first computer creating a plurality of resolution levels for one or more of the plurality of nodes based at least in part on the screen size of the second computer;

the first computer rendering to the second computer an initial batch of nodes;

the second computer monitoring how the initial batch of nodes is manipulated by a user of the second computer;

the second computer formulating a second request based at least in part on a result of the monitoring step;

the second computer sending the second request to the first computer; and

the first computer supplementing a subsequent batch of nodes to the second computer in accordance with the second request.

21. The method of claim 20, wherein the initial batch of nodes has a first resolution level, and the subsequent batch of nodes has a second resolution level that is finer than the first resolution level.

22. The method of claim 20, wherein the monitoring step is performed in association with a pan/zoom user interface of the second computer.

23. The method of claim 22, wherein the pan/zoom user interface uses a coordinate system that corresponds with the virtual layout space.

24. A method for delivering a document by a first computer in response to a request for the document from a second computer over a computer network, the method comprising the steps of:

decomposing the document into a plurality of nodes in accordance with a document model associated with the document;

associating each of the plurality of nodes with one or more regions of a virtual layout space,

creating a plurality of resolution levels for one or more of the plurality of nodes, wherein the plurality of resolution levels comprises at least a coarse resolution, a medium resolution, and a fine resolution;

preparing a skeleton document comprising one or more of the plurality of nodes represented in the coarse resolution;

rendering the skeleton document to the second computer;

anticipating which region of the virtual layout space that the second computer is likely to view next based at least in part on how the skeleton document is manipulated by a user of the second computer;

delivering nodes represented in the medium resolution based on a result of the anticipating step; and

delivering nodes represented in the fine resolution if the user specifically selects a region associated with the nodes.

25. A method for delivering a document by a first computer to a second computer over a computer network, the method comprising the steps of:

receiving an initial request for the document by the first computer from the second computer;

obtaining a first version of the document by the first computer;

decomposing the first version into a plurality of nodes by the first computer in accordance with a document model associated with the document;

creating a virtual layout space for the document by the first computer, wherein the virtual layout space comprises a plurality of regions;

associating each of the plurality of nodes with at least one region of the virtual layout space by the first computer;

preparing a baseline document by the first computer, wherein the baseline comprising one or more of the plurality of nodes;

rendering the baseline document by the first computer to the second computer;

caching the baseline documents by the first and second computers;

receiving a subsequent request for the document by the first computer from the second computer;

obtaining a second version of the document by the first computer;

comparing nodes of the second version to the nodes of the baseline document by the first computer; and

rendering differences between nodes of the second version and nodes of the baseline document, if any, by the first computer to the second computer.

26. The method of claim 25, further comprising the step of updating the baseline document with the differences by the first and second computers.